

5-07-04

BEFORE THE PUBLIC UTILITIES COMMISSION  
OF THE STATE OF HAWAII

PUBLIC UTILITIES  
COMMISSION

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PUBLIC UTILITIES COMMISSION	)	DOCKET NO. 03-0371
	)	
Instituting a Proceeding to Investigate	)	
Distributed Generation in Hawaii	)	
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STATEMENT OF POSITION

OF

HAWAII RENEWABLE ENERGY ALLIANCE

AND

CERTIFICATE OF SERVICE

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OF THE STATE OF HAWAII

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PUBLIC UTILITIES COMMISSION ) DOCKET NO. 03-0371  
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**I. INTRODUCTION AND SUMMARY**

The Hawaii Renewable Energy Alliance hereby submits this document, including our Statement of Position, dated May 7, 2004, to the Public Utilities Commission (PUC), in accordance with the PUC's Prehearing Order Number 20922 (Reference Docket No. 03-0371).

HREA believes Distributed Generation (DG), as defined herein, are the preferred alternatives to conventional fossil central generation (CG) power for meeting customer demand. Through rigorous implementation of DG, new fossil CG can be deferred and ultimately avoided. Implementation of DG requires a new market structure that promotes innovation and vibrant competition, hedges against future rate increases and provides other benefits to the ratepayer, the utility, industry and the state.

The implementation and impact of DG will be paced, in part, on: (1) how rapidly Hawaii's electricity market is opened to increased competition, (2) getting the new market structure right, (3) encouraging innovation in the market place, and (4) the availability and dedication of private sector resources to pursue new market opportunities.

The benefits that DG can provide include: (1) more efficient use of fossil fuels, while we still need them, for the generation of electricity, (2) an evolution of a more sustainable, environmentally-friendly, energy-secure future by implementing an optimal mix of DG, (3) mitigating future fossil fuel price uncertainties and placing us on a path to a more affordable energy future, and (4) reducing financial risk to our utilities and their ratepayers.

## 1    **II.    HREA's STATEMENT OF POSITION**

2            HREA believes that Distributed Generation (DG) is the preferred alternative to  
3    conventional fossil central generation (CG) power for meeting existing and future customer  
4    demand. However, before we discuss the specific issues raised in the PUC's Prehearing  
5    Order, we would like to establish and illustrate a common jargon as it applies to this Docket.

### 6    **A.    A Common Jargon**

7            The following terms are defined and illustrated herein: back-up power, central  
8    generation, combined heat and power, distributed generation, energy conservation, energy  
9    efficiency, energy service provider, energy storage, hybrid renewable energy systems,  
10    renewable energy, and sustainable energy.

11           Back-up power is as-needed power provided by supply-side devices, such as  
12    reciprocating engines. Traditionally, these devices are used to charge batteries or to meet  
13    electrical load requirements when the primary devices are not operating.

14           Central Generation (CG) is large conventional, fossil-fueled facilities (one or more units  
15    of one or more types of prime movers/electrical generators), which provide electricity to  
16    customers via a transmission and distribution network.

17           Combined Heat and Power (also referred to as cooling, heating and power or  
18    cogeneration) is the sequential production of electricity and useful thermal energy such as  
19    steam, hot and chilled water, refrigeration and humidity control.

20           Distributed generation (DG) includes supply- and/or demand-side devices and measures  
21    that provide electricity, thermal and/or mechanical energy. These resources can be located on-  
22    site or nearby to users. They can be used to meet baseload power, peaking power, backup  
23    power, remote power, power quality, and cooling, heating and power needs. DG includes  
24    energy supply devices ("prime movers") for providing electricity, thermal, and /or mechanical  
25    energy to users from on-site or nearby locations, and energy storage and interconnection  
26    equipment needed to interconnect with customers and/or the utility grid. Examples of DG are

1 wind turbines, biomass cogeneration, hydroelectric plants, photovoltaics, fuel cells,  
2 microturbines, reciprocating engines, and pumped hydro storage. DG also includes demand-  
3 side devices and measures include energy conservation and energy-efficiency as defined  
4 herein.

5 Energy conservation is those measures that preclude or avoid the need to generate  
6 electricity. These include: (1) alternative ways to heat water, e.g., solar hot water heaters for  
7 homes or other buildings, and high temperature systems for commercial or industrial uses (e.g.,  
8 laundries, food processing, etc.), (2) alternative ways to condition the air in our buildings, e.g.,  
9 solar air conditioning and seawater water air conditioning, and (3) a myriad of consumer-  
10 oriented approaches to conserve energy, e.g., turning lights off when they are not needed,  
11 opening windows instead of using air conditioning, consolidating home laundry to reduce the  
12 number of machine wash loads per week, using the sun to dry clothes, etc.

13 Energy efficiency is those measures that reduce the amounts of electricity required to  
14 accomplish the same task by: (1) deployment of higher efficiency lighting, appliances, motors  
15 and other electrical equipment. Examples include use of compact fluorescent lights, higher  
16 efficiency refrigerators and air conditioners, and various load management options; (2) load-  
17 shifting, e.g., the utility offers lower electric rates during off peak times to encourage shifting of  
18 loads and thereby increase the overall system efficiency; and (3) upgrading the utility  
19 infrastructure with more efficient components and equipment to reduce line losses, e.g., higher  
20 capacity transmission lines and higher-efficiency transformers and switchgear.

21 Energy Service Provider is an entity that provides electric service to a retail or end-use  
22 customer.

23 Energy storage is defined as electrochemical and kinetic energy technologies which  
24 allow energy to be accumulated, stored and then released at a later time. These technologies  
25 include batteries, flywheels, compressed air, hot and cold water, pumped hydro and liquid,  
26 compressed or solid-state forms of hydrogen.

1        Hybrid Renewable Energy Systems are electrical-energy systems comprised of two or  
2 more renewable energy components with or without energy storage and/or back-up power.  
3 Some examples are wind/diesel, PV/battery, wind/PV/battery, and wind/PV/battery/biodiesel.  
4 Note: in this case, biodiesel means a diesel-electric generator which uses biodiesel fuel or a  
5 blend of biodiesel with conventional diesel fuel.

6        Renewable energy are those sources of energy that are naturally and constantly  
7 replenished, e. g., wind, solar, biomass, geothermal, hydro, ocean thermal and wave. One of  
8 the major benefits to Hawaii is that we have all of these renewable sources already in use or  
9 potentially available for development.

10       Sustainable energy is defined as those sources of energy that meet Hawaii's needs now  
11 without compromising future generations of Hawaii the ability to meet their needs, e.g.,  
12 sustainable energy is an integrated combination of energy conservation, energy efficiency,  
13 renewable energy and energy storage. In the near-term, a path to sustainable energy must  
14 necessarily include more efficient use of fossil energy, and in the mid-term, use of fossil energy  
15 sources only as back-up power.

## 16    **B. HREA's Position on the Issues**

17        The following is HREA's position on the issues as stated on pages 2 and 3 in the  
18 Prehearing Order:

### 19    **Planning Issues:**

20           Overall: HREA believes planning issues are important, as they set the stage for the  
21 design and implementation of the DG market place.

- 22        1. What forms of distributed generation (e.g., renewable energy facilities, hybrid  
23 renewable energy systems, generation, cogeneration) are feasible and viable for  
24 Hawaii?

1           **HREA Position:**

2           Our position depends, in part, on the implementation timeframe. For purposes of  
3           this discussion, the timeframe is broken down into three periods: near-term (now to  
4           5 years from now), mid-term (5 to 15 years from now), and far-term (15 to 30 years  
5           from now). Therefore, we consider the following DGs feasible and viable for Hawaii,  
6           now or as indicated below:

- 7           • Renewable: individual wind turbines, windfarms, photovoltaics (PV), solar hot  
8           water (SHW), solar air conditioning (SAC), geothermal (binary-cycle), run-of-  
9           the-stream hydro, sea water air conditioning (SWAC) in the near-term; solar  
10          thermal electric (STE) in the mid-term; and ocean and wave in the mid- to  
11          far-term;
- 12          • Hybrid renewable energy systems, which would typically be installed and  
13          operated at the customer's site;
- 14          • Storage: pumped hydro, and possibly some advanced battery concepts, such  
15          as the flow battery;
- 16          • Combined, Heat and Power (CHP): fossil (diesel/heat-recovery,  
17          microturbines/heat-recovery, fossil-fueled fuel cells/heat-recovery); and  
18          • Combined, Heat and Power: renewable (Solar Air Conditioning/Electricity,  
19          and renewably-fueled fuel cells)

20          Note: we do not consider this to be an exhaustive list, but a work in progress.  
21          Specifically, new technologies will evolve and enter the market place, based on their  
22          cost/performance standards and the ease of entry to the market.

23          2. Who should own and operate distributed generation projects?

24          **HREA Position:**

25          We believe that there are a number of possible options for ownership and operation

1 of DG projects, including the regulated utilities and coops, un-regulated utility  
2 entities, other energy service providers, and/or end-users. All options could work, if  
3 each owner/operator is bound by the same rules and all barriers to the market are  
4 removed. However, the regulated utility would have an inherent advantage, if they  
5 were allowed to compete directly with other energy service providers, due to the  
6 utility's detailed knowledge of their customers and their financial strength and  
7 backing by the ratepayers.

8 Thus, we believe that the regulated utility, if they wish to participate in the DG  
9 market, should be required to set-up an un-regulated utility entity completely  
10 independent of the regulated utility, with appropriate firewalls erected and enforced.  
11 The un-regulated utility entity would then compete with our energy service providers.

12 The end-user might choose to own and operate the facility, or choose to own and  
13 then contract an energy service provider to operate the facility.

- 14 3. What is the role of the regulated electric utility companies and the Commission in the  
15 deployment of distributed generation in Hawaii?

16 **HREA Position:**

17 The regulated utility companies should plan for and facilitate implementation of DG  
18 through IRP. For example, the utilities could identify specific areas (geographic  
19 areas as well as end use market segments that influence peak demand) where DG  
20 is needed and solicit proposals, possibly including a rebate program, such as used  
21 in the current residential efficient water heating and other DSM programs.

22 Through creation and implementation of administrative rules, the PUC should ensure  
23 that: (a) DG energy service providers have access to the market, (b) interconnection  
24 and operational requirements are fair and equitable to all parties, and (c) the utility is  
25 not able to exert its monopoly power and unfairly influence the market place.

## 1    **Impact Issues:**

2            Overall: HREA believes it is important to study the impacts of DG, both positive and  
3            negative, in order to assess the overall costs and benefits of planning for and  
4            implementing DG.

- 5            4. What impacts, if any, will distributed generation have on Hawaii's electric  
6            transmission and distribution (T&D) systems and market?

### 7            **HREA Position:**

8            We believe the impacts will be primarily positive, especially if DG is planned and  
9            implemented under IRP. For example:

- 10            • DG will help increase the overall reliability of our island grids, i.e., the addition  
11            of generators on the system increases reliability. Specifically, the probability  
12            of multiple generators failing at the same time decreases, improving reliability  
13            of the system. Also, individual failures will be mitigated to the degree that the  
14            DG will be smaller in capacity and their impacts will be less than larger  
15            generators (e.g., the loss of a 2 MW DG will be much less of an impact than the  
16            loss of a 200 MW CG);
- 17            • DG can be implemented to defer or avoid T & D upgrades and new T & D  
18            (such as with new construction of hotels and resorts);
- 19            • DG can be implemented to provide rate relief to specific customers without  
20            impacting other ratepayers negatively. Initially, DG will be offsetting new  
21            demand. Thus, DG will defer new fossil CG and help avoid rate increases, if  
22            implemented in an innovative and competitive manner, and DG is not rate-  
23            based. However, if DG is rate-based, ratepayers will likely be subjected to  
24            rate increases as they have historically with the installation of new CG; and



- Over time, DG can be implemented to replace capacity from CG as it is retired. This, of course, will need to be included in the utility's IRP process and, perhaps, required directed implementation of DG.

5. What are the impacts of distributed generation on power quality and reliability?

**HREA Position:**

Power Quality. We believe that power quality from DG will equal or exceed the utility's existing power quality. In general, power quality can be assured if DG meet applicable Institute of Electrical and Electronic Engineers (IEEE) standards and are certified by the Underwriter Laboratory (UL) or other certification entities. However, there will be times when a technical definition of power quality may be required, and, perhaps, in situ testing to confirm the power quality of a specific DG.

Reliability. Reliability can be defined a number of ways. For example, reliability is typically the probability of a given event, such as continuous operation of a generator or a transmission system (i.e., no failures). As noted above, DG will help increase the overall reliability of our island grids, i.e., the addition of generators on the system increases reliability, as the probability of multiple generators failing at the same time decreases, and individual failures will be mitigated to the degree that DG will be smaller in capacity.

Reliability can also be defined more specifically in terms of percentage of the time the DG is available to generate and deliver electricity, as opposed to being down, due to routine maintenance or for repairs. This percentage, however, is usually referred to as the DG or generator availability.

A third definition relates to whether the DG is delivering power at a specific time. For example, a fossil generator is typically viewed as highly reliable, and considered to be firm power, i.e., you can turn it on when you want it and it will be there (assuming you have fuel). A wind turbine can only generate electricity, if there is

sufficient wind, and is therefore, considered intermittent or as-available by the utility. Consequently, firm power is given more value by the utility.

Notes: system availabilities for wind turbines, PV, geothermal and hydro (all of which are considered intermittent), can be very high, even higher than fossil generators. However, the power delivery reliability of all generators is a function not only of their system availabilities, but also on the availability of their resource, such as the wind, the sun, geothermal fluids, and water for renewables, and the specific fossil fuel for conventional generators.

6. What utility costs can be avoided by distributed generation?

**HREA Position:**

We believe there are a number of utility costs that can be deferred and/or avoided by DG including:

- Cost of new generation: If aggressively implemented, DG (as defined herein) and defer and possibly avoid the need for new CG. If implemented competitively (hence no rate-basing of DG), the utility costs for new CG can be avoided;
- Avoided line losses: implementation of DG will reduce line losses. Hence, utility costs associated with line losses can be avoided;
- Avoided T&D upgrades: similarly, implementation of DG, properly planned in IRP, will reduce the need for T&D upgrades. Hence, utility costs associated with T&D upgrades can be avoided; and
- Cost for spinning reserve: Spinning reserve can help improve system reliability and also provide load-following capability. Not all of the islands have a spinning reserve policy. With the installation and DG, it may be possible to reduce spinning reserve requirements, and those costs could be avoided by the utility.

1           7. What are the externality costs and benefits of distributed generation?

2           **HREA Position:**

3           We believe a number of potential externalities can be identified, but, given the  
4           results of HECO's Externality Study, there is no consensus on how to monetize the  
5           externalities. Examples of externality benefits of DG are:

- 6           • Reduction in fossil fuel emissions from conventional generators, e.g., carbon  
7           dioxide (CO<sub>2</sub>), nitrogen oxides (NO<sub>x</sub>), sulfur oxides (SO<sub>x</sub>) and particulates.  
8           The amounts of these emissions can be calculated for each conventional  
9           generator, and the total amount of emissions avoided per MWH based on the  
10          operational profile of each of the utility grids;
- 11          • Conservation of Water needed to cool conventional generators, e.g., steam  
12          turbine generators. Similarly to the air emissions, water usage can be  
13          calculated for each conventional generator and expressed as the number of  
14          gallons per MWH based on the operational profile of each of the utility grids;
- 15          • Energy Security benefits from DG accrue based on the reduction of fossil  
16          fuel needs. These benefits would include: reduced risks associated with  
17          energy supply, such as supply disruptions due to political or terrorist events,  
18          and risks associated with oil spills at sea or in the islands;
- 19          • Energy price risk benefits accrue when renewables, energy conservation  
20          and/or conventional energy efficiency measures are substituted for fossil  
21          fuels, i.e., if we don't use any fossil fuel, we wouldn't have to worry about oil  
22          price fluctuations. Consequently, the price risks are reduced as we reduce  
23          our dependence on oil. Additional benefits accrue, but to a lesser degree,  
24          when CHP, are employed. Nevertheless, while fuel prices tend to fluctuate  
25          independent of the Hawaii market, we can hedge our overall energy price  
26          risks by reducing the amount of fossil fuels we import.

1 8. What is the potential for distributed generation to reduce the use of fossil fuels?

2 **HREA Position:**

3 We believe there is significant potential for DG to reduce the use of fossil fuels  
4 Hawaii. For example:

- 5 • Based on a renewable study conducted by WSB-Hawaii for the Hawaii  
6 Energy Policy Forum, there is potential (based on implementing wind, solar  
7 and biomass projects) to double our renewable energy percentage in Hawaii  
8 in 2003 (about 6%) to 11.7% in 2008, and more than double the percentage  
9 in the subsequent 10 years to 28.6% in 2018. (For details, see the report at  
10 <http://hawaiienergypolicy.hawaii.edu/papers/bollmeier.pdf>); and
- 11 • Twenty to fifty percent of current building demand could be saved through  
12 energy conservation and energy-efficiency measures including CHP.

13 **Implementation Issues:**

14 Overall: HREA believes these issues are at the heart of the docket. Specifically, we  
15 believe there will be consensus on the need to do DG. We believe the primary  
16 issues will revolve around who gets to play, what does the market look like and what  
17 are the rules.

18 9. What must be considered to allow a distributed generating facility to interconnect  
19 with the electric utility grid?

20 **HREA Position:**

21 We believe it is appropriate for the PUC to qualify or approve DG facilities for  
22 interconnection with the electric utility grid. A number of factors may be considered  
23 in making the determination, including the:

- 24 • party that will own the facility;
- 25 • party that will operate the facility;

- current industry DG design, installation and operation practices, and whether the facility will meet or exceed those practices. It will be desirable if these practices have been approved by a standards-making entity;
- utility interconnection and operational requirements and whether the facility will meet or exceed those requirements. Also, it will be desirable if these requirements have been developed in a voluntary consensus manner with participation from the utility, industry, the PUC, and other interested Parties;
- applicable National Electric Code (NEC), Institute of Electrical and Electronic Engineers (IEEE) standards, and whether the facility will meet those standards; and
- approval of applicable certification entities, such as the Underwriter Laboratory (UL), for the facility and its subsystems and components.

10. What are the appropriate rate design and cost allocation issues that must be considered with the deployment of distributed generation facilities?

**HREA Position:**

We believe that an appropriate rate design can help facilitate the implementation of DG, and cost allocation issues should be addressed in a way that will also help facilitation of DG. For example:

- Rate Design. A tiered-rate system (where increasing levels of usage are billed at a higher rate), combined with a low customer charge could be implemented to encourage DG. Such a system would encourage the customer to investigate DG measures to reduce site load. Note: a tiered-system approach could also obviate the need for current, low-income user subsidies.

- Cost Allocation Issues. The utility should be allowed cost recovery for those costs associated with implementing DG under IRP. Values for the distributed benefits should be identified and used to facilitate DG implementation. For example, these benefits could be allocated to the off-set DG planning costs in IRP and also to finance rebates, as appropriate, to encourage DG.

11. What revisions should be made to the integrated resource planning process?

**HREA Position:**

We believe DG should be planned and implemented in IRP. For example:

- A working definition of DG has been defined herein to include DG as normally defined and, in addition, energy conservation and energy-efficiency measures. This working definition includes all DG located at or near a customer's site, i.e., on either side of the customer's meter, and all DG located closer to load centers than CG;
- DG should be given a very high priority in IRP and be planned to help meet our electricity demand and other goals and requirements, such as our existing Renewable Portfolio Standard (RPS) law and any future amendments to the law. In this regard, the output of IRP should be an optimal mix of DG measures. Ideally, performance and cost parameters will be developed, from which the most cost-effective measure would be selected first, and subsequent measures until the capacity and energy requirements are met for the specific planning horizon;
- DG, which has been added to HECO's 3<sup>rd</sup> Round IRP, should be added to all of the utility IRPs; and

- A DG implementation plan should be prepared as part of IRP, and subsequently, tracked once the IRP has been approved by the PUC. The plan should include:
  - (1) a specification of which DG measures will be included;
  - (2) a procurement plan that includes preliminary specifications for desired DG additions, a timeline and selection criteria; and
  - (3) development and implementation of standard offer contracts for applicable DG in order to expedite contract negotiations.

12. What forms of distributed generation (e.g., renewable energy facilities, hybrid renewable energy systems, generation, and cogeneration) are feasible and viable for Hawaii?

**HREA Position:**

As noted previously (Issue #1), our position depends, in part, on the implementation timeframe. For purposes of this discussion, the timeframe is broken down into three periods: near-term (now to 5 years from now), mid-term (5 to 15 years from now), and far-term (15 to 30 years from now). Therefore, we consider the following DGs feasible and viable for Hawaii now or as indicated below:

- Renewable: individual wind turbines, windfarms, photovoltaics (PV), solar hot water (SHW), solar air conditioning (SAC), geothermal (binary-cycle), run-of-the-stream hydro, sea water air conditioning (SWAC) in the near-term, solar thermal electric (STE) in the mid-term, and ocean and wave in the mid- to far-term;
- Hybrid renewable energy systems, which would typically be installed and operated at the customer's site;
- Storage: pumped hydro, and possibly some advanced battery concepts, such as the flow battery;

- Combined, Heat and Power (CHP): fossil (diesel/heat-recovery, microturbines/heat-recovery, fossil-fueled fuel cells/heat-recovery); and
- Combined, Heat and Power: renewable (Solar Air Conditioning/Electricity, and renewably-fueled fuel cells).

Note: we do not consider this to be an exhaustive list, but a work in progress. Specifically, new technologies will evolve and enter the market place, based on their cost/performance standards and the ease of entry to the market.

13. What revisions should be made to state administrative rules and utility rules and practices to facilitate the successful deployment of distributed generation?

**HREA Position:**

We believe a new that revisions to the following existing administrative rules may be required:

- HAR6-61-Rules of Practice and Procedure before the Public Utility Commission;
- HAR6-74-Standards for Small Power Producers and Cogeneration; and
- Title VII, General Order No. 7, Standards for Electric Utility Service in the State of Hawaii.

We also believe it may be appropriate to develop a specific administrative rule for the Distributed Generation.

We reserve the right to make more specific recommendations at a later time.

14. The Parties and Participants may also address general issues regarding distributed generation raised in the informal complaint file by Pacific Machinery, Inc., Johnson Controls, Inc. and Noresco, Inc. against HECO, MECO and HELCO on July 2, 2003 (Informal complaint No. IC-03-098), but not specific claims made against any of the Parties named in the complaint.



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### C. Conclusion

DATED: May 7, 2004, Honolulu, Hawaii

President, HREA

### CERTIFICATE OF SERVICE

I hereby certify that I have this day served the foregoing Statement of Position upon the following parties by causing a copy hereof to be hand-delivered or mailed, postage prepaid, and properly addressed the number of copies noted below to each such party:

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Dated: May 7, 2004

  
President, HREA